

# Landfill Gas to Energy for Federal Facilities



## Fact Sheet

### Biomass Alternative Methane Fuels Super ESPC Program



### Industry Snapshot

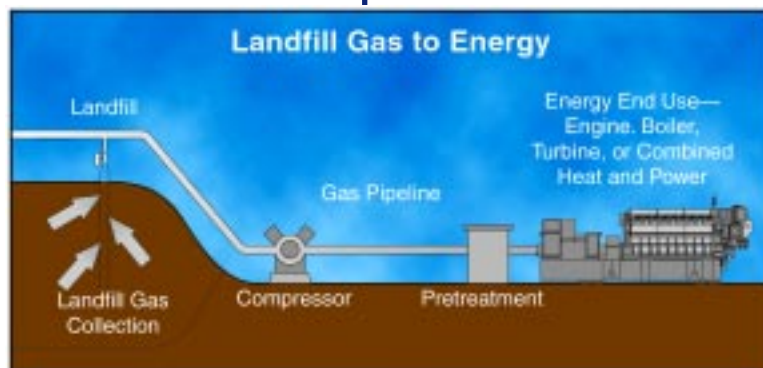
Landfill gas (LFG) was first collected and used as a fuel in the United States in the late 1970s, and the technology has developed steadily since then. This method of producing renewable energy is now regarded as one of the most mature and successful in the field of green power.

The U.S. Environmental Protection Agency (EPA) estimates that LFG is collected from more than 330 landfills in the United States and put to beneficial use. More than 1000 MW of electricity is produced from more than 200 LFG-to-energy projects now in operation. Additionally, more than 100 projects are delivering useful thermal energy, either directly or as a byproduct of electricity generation. EPA estimates that another 600 landfills are good candidates for economical LFG-to-energy projects.

### Applications

In a typical BAMF LFG project, a pipeline is built from the landfill to the federal facility and then end-use equipment is installed or reconfigured to use the resource.

A wide range of systems, including internal combustion engines, diesel generators, microturbines, and other technologies can use LFG to produce electricity; and most boilers can be reconfigured to burn LFG to produce hot water or steam.



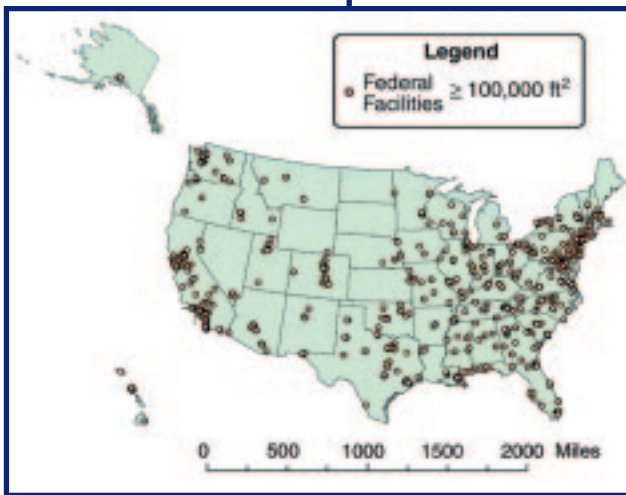
LFG usually consists of about 50% methane and 50% carbon dioxide and can generally be used to supplement or replace natural gas. For some applications, the LFG must be conditioned first to increase its Btu content or filter out impurities.

#### *The BAMF Super ESPC*

Federal agencies can use energy savings performance contracts (ESPCs) to finance their energy projects, allowing them to reduce their energy use and costs without depending on Congressional appropriations to fund the improvements. Using FEMP's Super ESPCs, agencies can partner with prequalified, competitively selected energy services companies (ESCOs) and use an expedited contracting process to implement their projects quickly. Federal facilities worldwide can use the Technology-Specific Biomass and Alternative Methane Fuels (BAMF) Super ESPC, which offers financing and private-sector expertise specifically geared to using renewable BAMF resources.

## Potential for Federal LFG Projects

Although piping distance in most projects is less than 10 miles, piping LFG up to 20 miles can be economically feasible, depending on gas recovery at the landfill and energy load at the end-use equipment. A FEMP assessment of BAMF resources identified significant potential for federal LFG-to-energy projects, based on the proximity of landfills to large federal facilities (over 100,000 ft<sup>2</sup>).



*Federal facilities within 15 miles of a candidate landfill.*

- More than 1200 large federal facilities are within 15 miles of at least one candidate landfill.
- Nearly 500 of these facilities are within 5 miles of a candidate landfill—well within the limits for economic feasibility.

## Benefits of LFG for Federal Facilities

- Energy cost savings
- Security from power grid interruptions
- Lowest-cost system for both accommodating a steady base load and providing back-up generation capacity
- Progress toward federal goals for use of renewable energy
- Hedge against fluctuations in fuel and power costs
- Significant environmental benefit from reduced greenhouse gas emissions

## Project Examples — LFG to Energy

### NASA Goddard Space Flight Center

LFG is fueling boilers at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) in Maryland. In fact, NASA is making history as the first federal agency to burn LFG on federal property.

The gas is piped about 5 miles to GSFC from the Prince George's County Sandy Hill Landfill. Two of the five boilers at GSFC were modified to burn LFG and use natural gas and fuel oil as backup.

NASA expects to save taxpayers an estimated \$3.5 million in fuel costs over the next 10 years while increasing energy security by relying on a locally available renewable fuel source. In addition, this LFG project will reduce greenhouse gas emissions by more than 1.6 million metric tons of CO<sub>2</sub> equivalents over 10 years. These greenhouse gas benefits are roughly equivalent to removing the emissions of more than 35,000 cars during every year of the project's lifetime.



*Pipes collect methane from inside the Sandy Hill Landfill to be piped to the Goddard Space Flight Center.*

## Lucent Technologies

Lucent Technologies estimates it saves \$100,000 per year on fuel bills by using LFG instead of fossil fuel to fire the boiler system at its Columbus, Ohio, facility. Lucent entered into a 20-year agreement in 1992 with SBM Energy to purchase LFG produced by the Bedford Landfill about 3 miles from its site. The landfill contains about 2.5 million tons of waste.

Lucent uses LFG to fuel boilers that generate steam for space heating and hot water. A backup system allows the boilers to supplement the LFG with natural gas if necessary. SBM agreed to sell LFG to Lucent for at least 10% less than the market price of natural gas. Sometimes the savings reach as much as 20%. SBM bears all the capital costs of the project, including installation and operation of the wells, construction of the pipeline from the landfill to the Lucent site, gas filtering and conditioning, and modifications to Lucent's boiler system.

After 13 years, the amount of gas the landfill is producing is beginning to decline slightly. It is expected to produce enough gas to recover profitably for about 5 more years. The project reduces greenhouse gas emissions by the equivalent of about 162,000 tons of carbon per year—roughly the amount that would be absorbed by 49,000 acres of trees or produced by 23,000 automobiles. In 1994, EPA presented Lucent with an award to recognize it as being the first industrial site to use LFG as a fuel.

## General Motors

General Motors is using LFG to displace coal and natural gas at three of its assembly plants and has made a commitment to buy at least 8 million kWh per year of electricity generated using LFG.

At its truck assembly plant in Fort Wayne, Indiana, one of three powerhouse boilers that supplies the plant was converted to use LFG delivered by pipeline from a landfill 8 miles away. The LFG supplies 16% of the energy used by the plant. GM estimates that using LFG will save as much as \$500,000 annually compared with using natural gas. Since the LFG price is fixed, using it avoids fluctuations in market prices for fossil fuels.

The Orion plant near Detroit has used LFG from two nearby landfills since 1998 to displace more than half of the coal once burned in its powerhouse. The 4 million ft<sup>2</sup> plant is located between the Eagle Valley Landfill, operated by Waste Management, Inc., and the Oakland Heights Landfill, operated by Allied Waste Systems. Methane from the landfills is used to fire the boilers that generate steam and provide utility service to the main assembly plant.

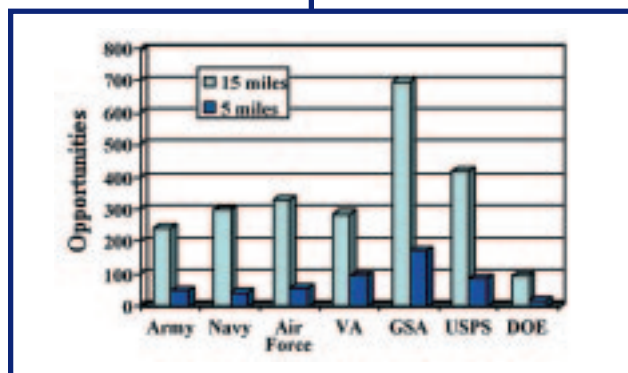


*This powerhouse boiler burns landfill gas.*

Before the switch to LFG, the powerhouse burned almost 60,000 tons of coal annually.

The switch to LFG has cut the amount of sulfur dioxide released into the air by 40% and nitrogen oxides by 46%. Some coal still is used during the winter months, but the boiler system runs exclusively on LFG during the rest of the year.

In January 2000, the implementation of LFG at the Orion assembly facility was named 1999 Project of the Year by the EPA Landfill Methane Outreach Program.



*Federal agencies with the most potential LFG project opportunities.*

### Rules of Thumb

- Landfills begin producing methane as soon as 6 months after they begin operation.
- The typical lifetime of an LFG-to-energy project is 10–20 years.
- One million tons of municipal solid waste can yield about 300 standard cubic feet per minute (scfm) of recoverable LFG—enough to deliver about 800 kW.
- An LFG project that uses 300 scfm yields the same reduction in greenhouse gases as removing an estimated 6000 cars from the road for a year or planting about 8000 acres of forest annually.

### For More Information

To find out more about the BAMF Super ESPC to implement an LFG-to-energy project at your facility, please contact one of the following:

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### A Strong Energy Portfolio for a Strong America

*Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.*



*Leading by example,  
saving energy and  
taxpayer's dollars in  
federal facilities*



*Bringing you a prosperous future  
where energy is clean, abundant,  
reliable, and affordable*